SDP Cross Agency and National Needs Summit

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This summit is organized and sponsored by the Software Design and Productivity (SDP) Coordinating Group within the National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD). [www.nitrd.gov] supports the planning, budget, and assessment activities for the Federal government's R&D investments. SDP R&D will lead to fundamental advances in concepts, methods, techniques, and tools for software design, development, and maintenance that can address the needs of Federal agencies and society for more usable, dependable, cost-effective, and sustainable software-intensive systems.

"Leadership in software is important for our economy, our security, and our quality of life."[1] Software increasingly underlies the basic national infrastructure and mission systems including communication, health care, transportation, the national power grid, weather forecasting, agriculture, finance, defense, and disaster response—as well as our scientific research infrastructure. Consequently, the Federal Government has direct responsibility and substantial interest in the US "capacity to design, produce, assure, and evolve software-intensive systems in a predictable manner while effectively managing risk, cost, schedule, and complexity"[2] of safety and mission critical systems. Unprecedented breakthroughs in software-intensive systems in the past have transformed the world and driven economic growth and the creation of well-paying jobs in the US. These breakthroughs include the Internet and aerospace systems that bring the world closer together and enable us to reach beyond the bounds of earth.

Future advances will depend on our ability to cost-effectively develop and sustain the transformative systems of tomorrow. In this budget-constrained era, advances in SDP are needed to enable the government to afford critical improvements in the nation's infrastructure, new missions, and ongoing maintenance for long-lived systems in civilian and defense agencies. In addition, improvements in SDP are critical for the Government's oversight role for systems impacting public safety—such as technology for effective yet affordable certification.

The purpose of this summit is to inform a crosscutting SDP research and technology agenda. It will provide a forum for bringing together policy makers, stakeholders, visionaries, and R&D leaders for software design and productivity research. The summit will build mutual understanding of agency needs and national priorities in SDP. Multitudes of fundamental advances in computer science have us poised for potential breakthroughs in SDP. Therefore, the time is right to assess what can be accomplished through new R&D investments. The summit will focus on the key issues of the SDP mission: to advance software engineering concepts, methods, techniques and tools that result in more usable, dependable, cost-effective, and sustainable software-intensive systems. The workshop will provide recommendations for action on the following topics:

1. **Research Challenges.** Identification of major challenges and opportunities for improving software affordability and responsiveness in development and sustainment efforts for safety and mission critical systems. Formulation of research and technology goals to address these key issues.
2. **Software Assurance.** Guidance and encouragement to certification authorities for qualifying new, more productive tools and methods for software design, development, test, verification, and sustainment leading to affordable certification of software-intensive systems.
3. **Cost-Effectiveness.** Development of software cost and schedule models that incorporate predictions of the impact of new technologies and provide reasonable predictability of cost, schedule and success for software projects.

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[1] *Designing a Digital Future: Federally Funded Research and Development in Networking and Information Technology*, PCAST Report, December 2010.

[2] Definition of "software producibility" from *Critical Code: Software Producibility for Defense*, National Research Council Report, 2010.